Space Weather Technical Forecast

Issued on Monday, 26 August 2024 at 00:14 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Moderate Solar Activity with further M-class flares expected. Chance of G1 Minor Storm intervals Day 2 (27 Aug) from CME glancing blow.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Activity was Low over the past 24hrs with only minor C-flaring, peaking with a C7.1 at 25/0652UTC from AR3800 in the south.

There are twelve regions on the Earth-facing disc. AR3800, near south-centre disc remains the most likely and notable flare source, consisting of a string of smaller spots, but including a small delta configuration in its intermediate spots. AR3790 in the southwest has historically been one of the larger spot regions, but has been relatively stable and remains a largely inactive region. AR3796 has shown slight growth of penumbra on some intermediate spots. Some slight decay continues to be observed in AR3801, while AR3799 maintains a simple bipolar structure. Two new regions are emerging around the eastern limb, one in the north where magnetic looping has been evident on SDO imagery, and the other in the south. The remaining regions remain small and simple, and are either stable or showing some signs of decay.

No Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: Slow wind conditions dominated. Solar wind speed, as measured by ACE at L1, was at background levels throughout, initially as high as 380km/s but since declining to around 330km/s. Density was below average. Interplanetary Magnetic Field (IMF), Bt, was weak, around 2-5nT. The north-south component, Bz, varied weakly between -5nT and +4nT. Phi angle was positive (away from the Sun). Geomagnetic activity was Quiet to Unsettled (Kp1-3).

Energetic Particles / Solar Radiation: High energy (greater than 10 MeV) proton flux observed by GOES18 remained at background. High energy electron flux (greater than 2MeV) observed at GOES16 was at background. The 24-hour fluence was below the Active threshold, with 3.67e6 integrated pfu observed at 26/0000UTC.

Four-Day Space Weather Forecast Summary
Solar Activity: M-class flares are expected with a slight chance of isolated X-flares.

Solar Wind /Geomagnetic Activity: A CME from the filament eruption near AR3794 just after 23/0100UTC has been assessed as passing mainly ahead of Earth, but with a glancing impact likely early Day 2 (27 Aug). There are no other Earth-directed CMEs. No coronal hole influences are expected, with background solar wind speeds generally persisting.

Mainly Quiet geomagnetic activity is expected with a slight chance of Unsettled spells. There is a chance of Active to G1 Minor Storm with any CME glance, most likely Day 2 (27 Aug).

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Energetic Particles / Solar Radiation: High energy proton flux is likely to remain at background, but with the potential to rise in response to any notable flares, giving a slight chance of reaching the S1 Minor Radiation Storm level. High energy electron flux is expected to remain at background levels. The associated 24-hour fluence is expected to persist below the Active level.

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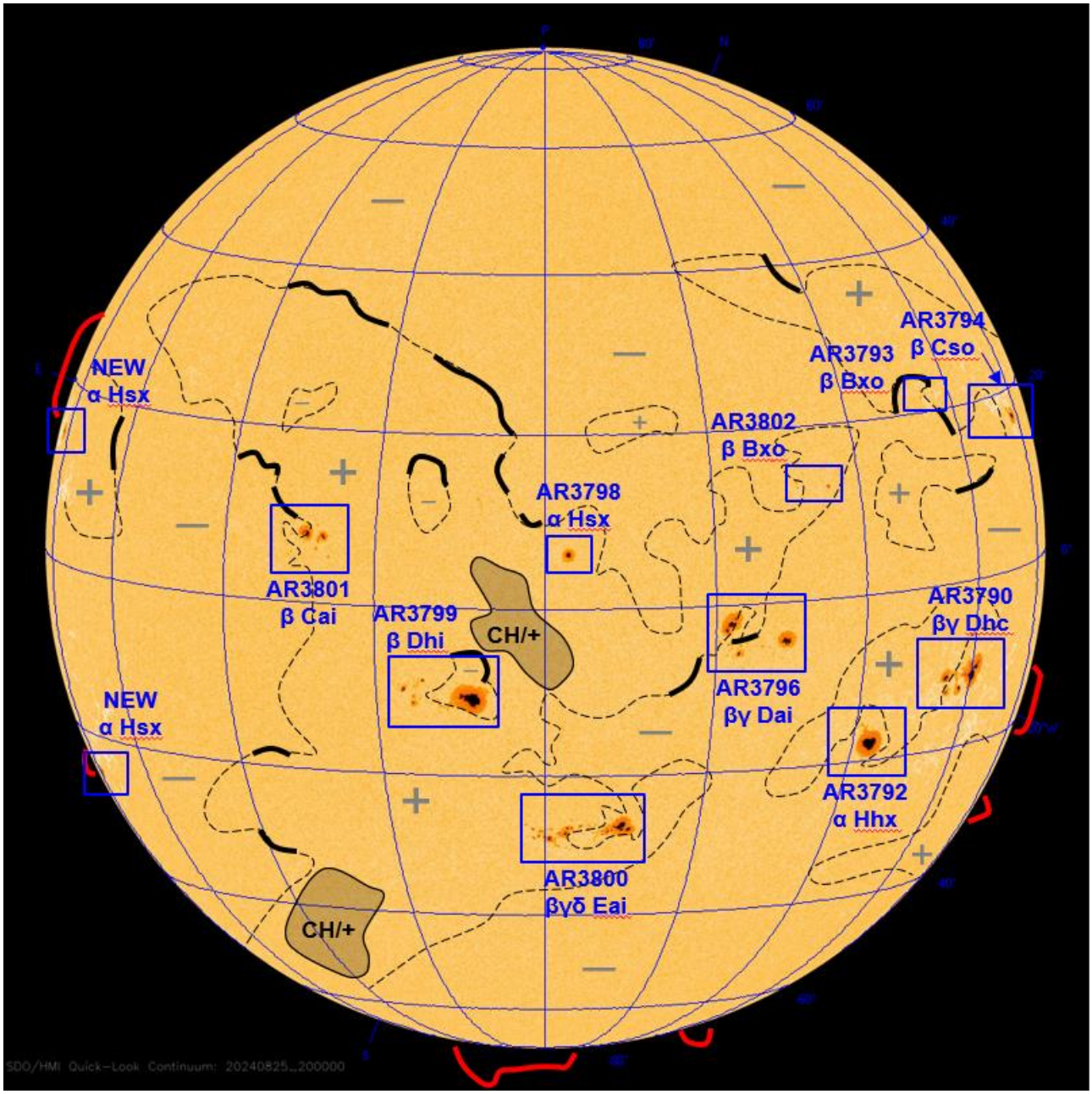
Figure 1. Solar Analysis Valid 25/2000UTC.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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Geomagnetic Storms:

A CME from a filament eruption near AR3794 just after 23/0100UTC, has been assessed as passing mainly ahead of Earth, but with a glancing arrival likely early Day 2 (27 Aug).

Otherwise mainly background slow wind conditions are expected. No other notable enhancements are currently forecast. Any fast wind from the unnumbered central disc coronal hole is currently not expected until beyond this forecast period.

Mainly Quiet geomagnetic activity is expected with a slight chance of Unsettled spells. There is a chance of Active to G1 Minor Storm with any CME glance, most likely Day 2 (27 Aug).

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	30	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Geomagnetic Activity - Earthbound Coronal Mass Ejections

Date/time 21.5R (UTC)	Halo: Full or Partial	Source	Source Location	Estimated Speed	Estimated Arrival Time	Comments
23/0858	Partial	C5 flare and filament eruption	NW, nr AR3794	416 km/s	27/0600 UTC +/- 9hrs	Low confidence. Glancing impact likely.

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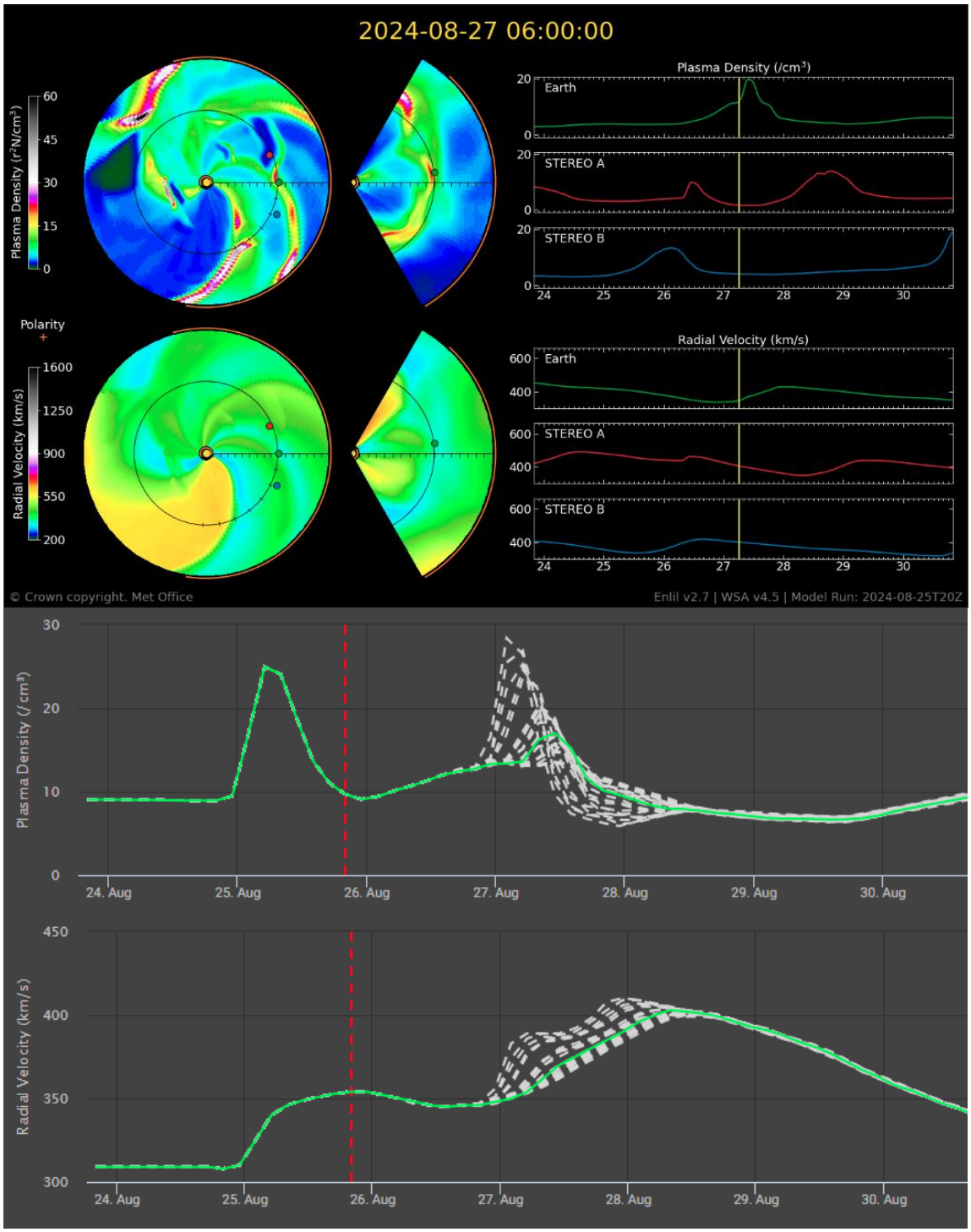
Figure 2: MOSWOC Enlil and Ensemble models



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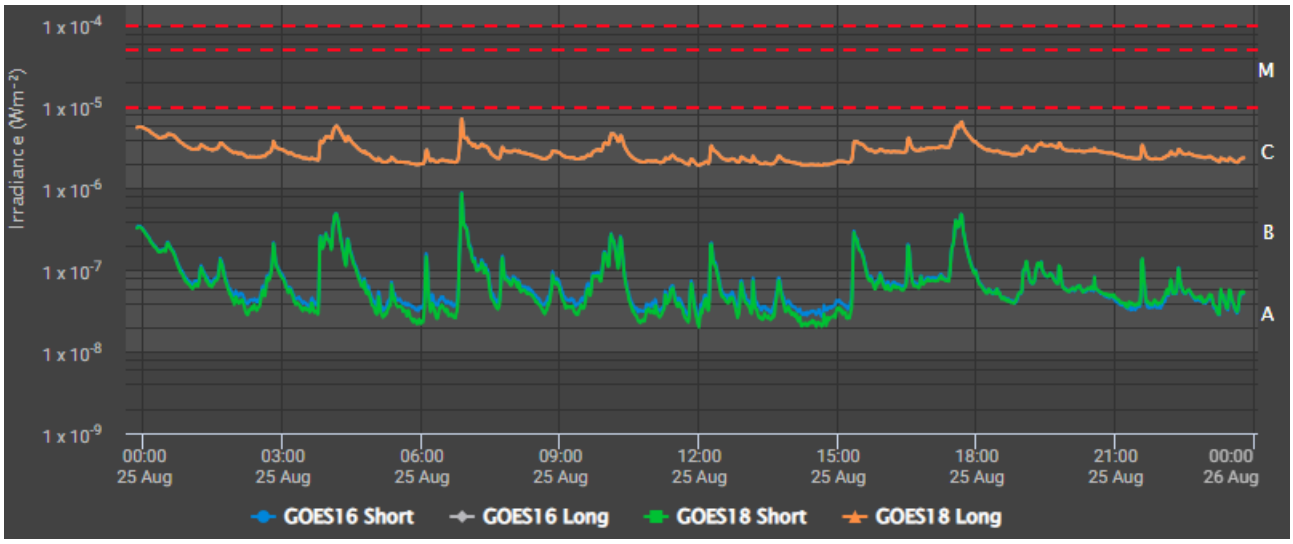
Radio Blackouts - X-Ray Flares:
Activity has been Low over the past 24 hours, with a C7.1 flare peaking at 25/0652UTC from AR3800 the highest in the period. Moderate activity is forecast with M-class flares expected and a slight chance of X-class flares.

There are twelve regions on the Earth-facing disc. AR3800, near south-centre disc remains the most likely and notable flare source, consisting of a string of smaller spots, but including a small delta configuration in its intermediate spots. AR3790 in the southwest has historically been one of the larger spot regions, but has been relatively stable and remains a largely inactive region. AR3796 has shown slight growth of penumbra on some intermediate spots. Some slight decay continues to be observed in AR3801, while AR3799 maintains a simple bipolar structure. Two new regions are emerging around the eastern limb, one in the north where magnetic looping has been evident on SDO imagery, and the other in the south. The remaining regions remain small and simple, and are either stable or showing some signs of decay.

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	70	70	70	70
Very Active	R3 to R5 X Class	No	10	10	10	10

Figure 3: GOES-16 & -18 X-ray flux for the past 24hrs.



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Solar Radiation Storms - (High Energy Protons):

High energy proton flux, as observed by GOES-18, is currently at background and expected to persist at this level. There are a number of moderately sized sunspot regions on the disc, with occasional low M-flares likely. Furthermore, a number of these are now either in, or soon to move into the western hemisphere, where it is favourable for any erupted protons to subsequently be observed at Earth. However the regions currently lack complexity that is ordinarily associated with the more proton rich events. Consequently, there is a chance that proton flux will rise given any notable flares, however this only gives a slight chance of exceeding the S1 Minor Radiation Storm threshold.

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

High Energy Electrons Event (≥ 2MeV):

High energy electron flux as observed by GOES-16 is currently at background and forecast to remain at this level, although likely with some moderate diurnal fluctuations.

Fluence is expected to remain below the Active (1e8 integrated pfu) threshold through the period. MOSWOC REFM is currently providing reasonable guidance.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ 2 MeV ≥ $1x10^8$**	No	1	1	1	1
Very Active	**≥ 2 MeV ≥ $1x10^9$**	No	1	1	1	1

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